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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,833	12/04/2001	Krishnaswamy Ramkumar	5298-06500	7743

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 01/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/010,833

Applicant(s)

RAMKUMAR ET AL.

Examiner

DuyVu n Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 12-25 is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☒ Claim(s) 8 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6, 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Arghavani et al. (US 5,780,346).

Arghavani describes a method for forming a shallow trench isolation comprising: polishing an upper layer 370 to expose a first underlying layer 330 (col. 6, line 66-col. 7, line 1; fig. 3h); etching away remaining portions of the first underlying layer 330 to expose a second underlying layer 320 (col. 7, line 2-5), wherein the layer 330 is formed upon and in direct contact with layer 320 (figure 3h); subsequently an etch-back step such as CMP is performed to isolate trench sidewall oxide 370 within the trench and figure 3j shows the second underlying 320 are also planarized by the CMP process (col. 7, line 6-11).

Referring to claim 2, the upper layer 370 removed is arranged above the upper surface of the first underlying layer 330 (fig. 3g).

Referring to claim 3, since the layer 330 is a polished-stop layer, it must be polished as it is exposed from the polishing of the upper layer 370.

Referring to claim 4, figure 3h shows the first underlying layer 330 is still on the substrate after the polishing of the layer 370; therefore, its thickness would be sufficient to prevent polishing through the first underlying 330 during polishing of the upper layer 370.

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Referring to claim 6, figure 3g shows the upper layer 370 is deposited within a trench prior to the polishing step.

Referring to claim 7, figure 3h shows the upper layer is remained within the trench and coplanar with the layer 330. This would read on claimed polishing the upper layer such that remaining portions of the upper layer are laterally confined by the sidewalls of the trench.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Arghavani as applied to claim 1 above, and further in view of Yieh et al. (US 6,114,216) and Chou et al. (US 6,348,389).

Unlike claimed invention, Arghavani doesn't describe forming the oxide layer 370 (upper layer), nitride layer 330 (first underlying layer), and the oxide layer 320 in a single process chamber. Yieh suggests to perform multiple process steps in situ in a same chamber during the producing of shallow trench isolation (col. 7, line 23-25). Chou, on the other hand, shows that these oxide and nitride layers can be formed in the same chamber (col. 4, line 22-25). It would have been obvious for one skill in the art at the time of the invention to modify Arghavani in light of Yieh and Chou to form these oxide, nitride layers in a same chamber because Yieh suggests that performing multiple process steps in the same chamber would reduce total processing time, ensure high quality processing, increases the control over process parameters,

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reduce moisture content in deposited film, and minimizes device damage due to metal or impurities contamination or process residue contamination (col. 7, line 22-33; col. 54, line 11-18).

Allowable Subject Matter

5. Claims 8 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 8 and 9 are allowable because applied prior art, Arghavani, doesn't describe or suggest the method comprises etching the planarized topography such that a third underlying layer is removed, wherein the third underlying layer is arranged beneath the second underlying layer.

6. Claims 10, 12-25 are allowed because Arghavani doesn't suggest forming the trench extending through a stack of at least 3 layers arranged over a semiconductor substrate, wherein the stack comprises intervening layers of different etching characteristics. He describes of 2 layers arranged above the substrate.

Response to Arguments

7. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 571-272-1462.

DVD
1/12/04

SUPERVISOR
NADINE G. NORTON
PRIMARY EXAMINER
Nadine Norton